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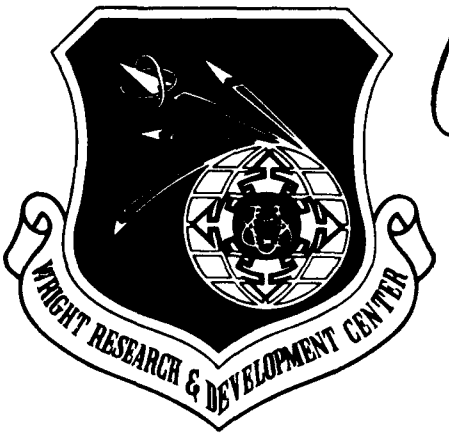
Volume V
Part 20



INTEGRATED INFORMATION SUPPORT SYSTEM (IISS)
Volume V - Common Data Model Subsystem
Part 20 - Neutral Data Manipulation Language (NDML) Precompiler
Generate Codasyl Request Processor Product Specification

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This technical report has been reviewed and is approved for publication.

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This specification establishes the design of Function PRE9.3, "Generate CODASYL Request Processor", one of the major functions of the configuration Item (CI) "Precompiler" to be built and formally accepted by the ICAM office.

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Vol V - Common Data Model Subsystem

Part 20 - Neutral Data Manipulation Language (NDML) Precompiler Generate Codasyl Request Processor Product Specification

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FOREWORD

This technical report covers work performed under Air Force Contract F33600-87-C-0464, DAPro Project. This contract is sponsored by the Manufacturing Technology Directorate, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Bruce A. Rasmussen, Branch Chief, Integration Technology Division, Manufacturing Technology Directorate, through Mr. David L. Judson, Project Manager. The Prime Contractor was Integration Technology Services, Software Programs Division, of the Control Data Corporation, Dayton, Ohio, under the direction of Mr. W. A. Osborne. The DAPro Project Manager for Control Data Corporation was Mr. Jimmy P. Maxwell.

The DAPro project was created to continue the development, test, and demonstration of the Integrated Information Support System (IISS). The IISS technology work comprises enhancements to IISS software and the establishment and operation of IISS test bed hardware and communications for developers and users.

The following list names the Control Data Corporation subcontractors and their contributing activities:

SUBCONTRACTOR	ROLE
Control Data Corporation	Responsible for the overall Common Data Model design development and implementation, IISS integration and test, and technology transfer of IISS.
D. Appleton Company	Responsible for providing software information services for the Common Data Model and IDEF1X integration methodology.
ONTEK	Responsible for defining and testing a representative integrated system base in Artificial Intelligence techniques to establish fitness for use.
Simpact Corporation	Responsible for Communication development.
Structural Dynamics Research Corporation	Responsible for User Interfaces, Virtual Terminal Interface,and Network Transaction Manager design, development, implementation, and support.
Arizona State University	Responsible for test bed operations and support.

TABLE OF CONTENT

SECTION 1

SCOPE

1.1 Identification

This specification establishes the design of Function PRE9.3, "Generate CODASYL Request Processor", one of the major functions of the Configuration Item (CI) "Precompiler" to be built and formally accepted by the ICAM Program Office. This CI constitutes one of the subsystems of the Common Data Model Processor (CDMP).

1.2 Functional Summary

The purpose of this Computer Program Configuration Item (CPCI) is to generate a COBOL program that will satisfy a retrieval or update NDML subtransaction against a CODASYL database.

The following functions will be performed by this CPCI:

1. Generate the Data Division section of the Request Processor.

    a) Generate file description and record layout if the NDML request resulted in a retrieval subtransaction.

2. Generate the Working Storage section of the Request Processor. These working storage variables will be used for:

    a) Conceptual/internal transformation of retrieval search parameters or update values.
    b) Internal/conceptual transformation of retrieved data fields.
    c) DBMS status checks.
    d) Retrieved qualification variables.

3. Generate the Procedure Division section of the Request Processor. It will include all the code to access a particular CODASYL database in order to satisfy the NDML request. This code will consist of:

    a) Interface code to the Request Processor Main program at runtime.
    b) Code to transform the retrieval search parameters or update values from conceptual to internal format.
    c) Code using DBMS specific calls to access the database to retrieve data or update data.
    d) Code to transform the retrieved data from internal to conceptual format.
    e) Code to save the retrieved data on a sequential file.
    f) Code to check DBMS status and report errors during runtime execution.

SECTION 2

DOCUMENTS

2.1 Reference Documents

1. ICAM Documentation Standards: IDS15012000A, 28 December 1981.

2. D. Appleton Co., CDM Administrator's Manual; UM620141000, March 1984.

3. D. Appleton Co., CDM1-IDEF, Model of the Common Data Model; CCS620141000, 15 May 1985.

4. D. Appleton Co., Computer Program Development Specification (DS) for ICAM Integrated Support System (IISS) Configuration Item: NDML Precompiler; DS620141200, October 1984.

5. D. Appleton Co., Embedded NDML Programmer's Reference Manual; PRM620141200, March 1985.

6. Softech, Inc., NTM Programmer's Guide: UM620140001, July 1984.

7. Control Data Corp., Computer Program Development Specification (DS) for ICAM Integrated Support System (IISS) Configuration Item: NDDL Command Processor: DS620141100, June 1985.

2.2 Terms and Abbreviations

Attribute Use Class: (AUC)

Conceptual Schema: (CS)

Common Data Model Processor: (CDMP)

Common Data Model: (CDM) Describes common data application process formats, form definitions, etc, of the IISS and includes conceptual schema, external, internal schemas, and schema transformation operators.

Data Field: (DF) An element of data in the external schema. It is by this name that an NDML programmer references data.

Database Management System: (DBMS)

Distributed Request Supervisor: (DRS) This IISS CDM subsystem configuration item controls the execution of distributed NDML queries and non distributed updates.

Domain: A logical definition of legal attribute class values.

Domain Constraint: Predicate that applies to a single domain.

External Schema: (ES)

Forms: Structured views which may be imposed on windows or other forms. A form is composed of fields where each field is a form, item, or window.

Forms Processor: (FP) A set of callable execution time routines available to an application program for form processing.

Internal Schema: (IS)

Integrated Information Support System: (IISS) A test computing environment used to investigate, demonstrate and test the concepts of information management and information integration in the context of Aerospace Manufacturing. The IISS addresses the problems of integration of data resident on heterogeneous databases supported by heterogeneous computers interconnected via a local Area Network.

Mapping: The correspondence of independent objects in two schemas: ES to CS or CS to IS.

Network Transaction Manager: (NTM) Performs the coordination, communication and housekeeping functions required to integrate the application processes and system services resident on the various hosts into a cohesive system.

Neutral Data Manipulation Language: (NDML) A language developed by the IISS project to provide uniform access to common data, regardless of database manager or distribution criteria. It provides distributed retrieved and single node updates.

ORACLE: Relational DBMS based on the SQL (Structured Query Language, a product of ORACLE Corp, Menlo Park, CA). The CDM is an ORACLE database.

Parcel: A sequential file containing section source code of the input application program.

Request Processor: (RP) A COBOL program that will satisfy a retrieval or update NDML subtransaction against a particular Database Management System.

User Interface: (UI) Controls the user's terminal and interfaces with the rest of the system.

Virtual Terminal Interface: (VTI) Performs the interfacing between different terminals and the UI. This is done by defining a specific set of terminal features and protocols which must be supported by UI software which constitutes the Virtual Terminal Definition. Specific terminals are then mapped against the Virtual Terminal software by specific software modules written for each type of real terminal supported.

SECTION 3

REQUIREMENTS

3.1 Structural Description

A graphic portrayal of this CPCI is included in Section 3.10. This chart shows the hierarchical relationships of each module making up this CPCI.

This CPCI is identified as module CDQPC and uses a number of lower level modules to handle specific operations such as:

1. Generate conceptual schema data definitions for retrieved data fields (CDRFT).

2. Generate internal schema data definitions for runtime search parameters (CDPRM).

3. Generate internal schema data definitions for retrieved data fields (CDRDF).

4. Generate conceptual schema data definitions for runtime search parameters or update values (CDMSG).

5. Generate working storage and procedure division code for the conceptual schema to internal schema transformation of runtime search parameters or update values (CDCI).

6. Generate working storage and procedure division code for the internal schema to conceptual schema transformation of retrieved data fields (CDIC).

7. Generate internal schema data definitions for qualified data fields (CDQDF).

8. Combine two work files into one file containing the Request Processor program (CDCWF).

9. Generate macros with the proper substitution parameters (CDMACR).

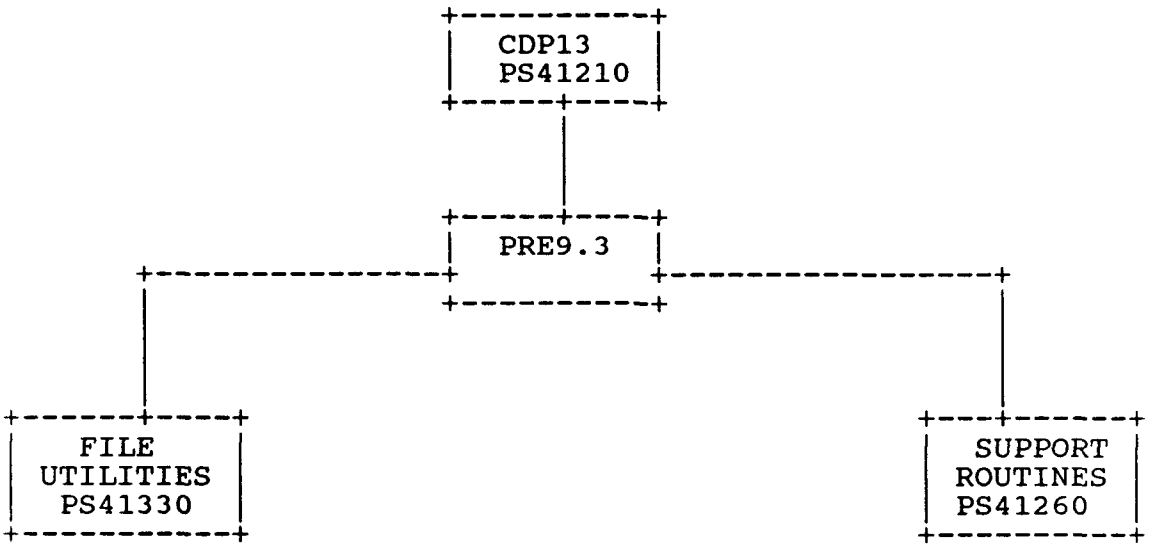
3.2 Functional Flow

This CPCI implements the logic defined in the Development Specification for this CPCI. Details of inputs/outputs and relationships between modules are to be found in Section 3.10.

This CPCI has been designated to operate in a batch or interactive mode. It must operate in the system environment established for IISS; that is, use of the Network Transaction manager. It must use the ORACLE DBMS installed on a DEC VAX computer.

3.3 Interfaces

The following diagram depicts the interface of PRE9.3 with other CPCI's in the system.



3.3.1 Inputs/Outputs

The following table depicts the inputs and outputs of this CPCI. A detail description for each item can be found in the DS for this CPCI.

Function: PRE9.3

INPUT	OUTPUT
Database Identification Number	Function Status
Database Schema Name	Database Sub-Schema Name
Database Location	Library Name
Target Host	Current Host
Request Processor Name	Current Subtransaction
Internal Schema Action List	Internal Schema Qualify List
Conceptual Schema Action List	Conceptual Schema Qualify List
Result Field Table	Generic CODASYL Command Table
Record Key Table	AP Information Table
Numeric Null Value	Error File Name
Character Null Value	
Subtransaction Boolean List	
Boolean List	
Complex Mapping Algorithm Table	

3.4 Program Interrupts

Not applicable to this CPCI.

3.5 Timing and Sequencing Description

This CPCI is called upon by the Request Processor Control Module, CDP13, for every CODASYL subtransaction identified by the current NDML request being precompiled.

3.6 Special Control Features

Not applicable to this CPCI.

3.7 Storage Allocation

3.7.1 Database Definition

The database used by this CPCI is the Common Data Model (CDM) database. This model is defined by the CDM1, the IDEF-1 model of the CDM, Reference Document Number 3. The database was constructed using the ORACLE DBMS.

3.7.1.1 File Description

No permanent files have been defined for this CPCI. It uses temporary scratch files for the generated program source code.

3.7.1.2 Table Description

All tables used by this CPCI have been defined by the Development Specification for this CPCI.

3.7.1.3 Item Description

Not applicable to this CPCI.

3.8 Object Code Creation

The object code for this CPCI will be created by the system integration test team by using defined IISS Software Configuration Management procedures. This CPCI will use the COBOL, FORTRAN, and C language compilers.

3.9 Adaptation Data

This CPCI has been coded using ANSI COBOL and a "standard" subset of the "C" languages. The intent was to provide a transportable system. Any system environment supporting these languages, a virtual memory management scheme, the COMM and NTM subsystems of IISS and the ORACLE Database Management System should be able to support this CPCI. Every possible attempt has been made to localize and identify any machine or environment dependent modules through the original design of the IISS and application of Configuration Management Procedures.

3.10 Detail Design Description

The following sections have been computer generated for this CPCI.

3.10.1 Where Include File Used List

The following lists each include file in the documentation group and all the modules documented in this specification which include them. The purpose of each module is listed as well.

DOCGROUP PS41255 Where-include-file-used List

Include File	Module Name
ERRFS	
	CDQPC
	CDRPMIF
ERRCDM	
	CDQPC
	CDRPMIF
FORVAR	
	CDQPC
INSTTBL	
	CDQPC
QPG2FD	
	CDQPC
COBLINE	
	CDQPC
CONFLD	
	CDQPC
COBOLOP	
	CDQPC
ERRORST	
	CDQPC
TMVALUE	
	CDQPC
SBSTLST	
	CDQPC
APINFO	
	CDQPC
APGC	
	CDQPC
BOOLST	
	CDQPC
SUBBOOL	

DOCGROUP PS41255 Where-include-file-used List

Include File	Module Name
	CDQPC
	CDRPMIF
CMAT	
	CDQPC
APRK	
	CDQPC
CSAL	
	CDQPC
CSQUAL	
	CDQPC
ISQUAL	
	CDQPC
	CDRPMIF
ISAL	
	CDQPC
RFTABLE	
	CDQPC
ERRPRO	
	CDQPC
	CDRPMIF
CHKCDM	
	CDRPMIF

3.10.2 Where External Routine Used List

The following lists each external function or routine in the documentation group and all the documented modules which call it. The purpose of each module is listed as well.

DOCGROUP PS41255 Where-external-routine-used List

System Module	Module Name
GENFIL	CDQPC
OPNFIL	CDQPC
CDRFT	CDQPC
CLSFIL	CDQPC
CDCWF	CDQPC
CDQDF	CDQPC
CDCMPRM	CDQPC
CDGTV	CDQPC
CDMSG	CDQPC
CDRDF	CDQPC
CDPRM	CDQPC
CDGENRT	CDQPC
CDMACR	CDQPC
CDRPCIF	CDQPC
CDQPOP	CDQPC CDRPMIF

DOCGROUP PS41255 Where-external-routine-used List

System Module	Module Name
CDRPIIF	
	CDQPC
CDRPUIF	
	CDQPC
OUTFIL	
	CDQPC
	CDRPMIF
RPTERR	
	CDQPC
ERRPRO	
	CDQPC
	CDRPMIF

3.10.3 Main Program Parts List

The following lists each Main Program in the documentation group and all the modules which are called either by that module itself or by any of the documented modules which it calls. It is possible for a non-main module to be listed more that once if it is called by multiple modules. The called modules, in this case known as program parts, are marked as to whether they are documented here. If so, the phrase "well-defined module" appears by the module name, if not it is an "external "routine". The Purpose of the Main Program module is listed as well.

DOCGROUP PS41255 Main Program Parts List

Main Pgm Name	Module Name	Module Type
CDQPC		
	GENFIL	External routine
	OPNFIL	External routine
	CDRFT	External routine
	CLSFIL	External routine
	CDCWF	External routine
	CDQDF	External routine
	CDCMPRM	External routine
	CDGTV	External routine
	CDMSG	External routine
	CDRDF	External routine
	CDPRM	External routine
	CDGENRT	External routine
	CDMACR	External routine
	CDRPCIF	External routine
	CDQPOP	External routine
	CDRPIIF	External routine
	CDRPUIF	External routine
	CDRPMIF	Well-defined module
	OUTFIL	External routine
	RPTERR	External routine
	ERRPRO	External routine
CDRPMIF		
	CDQPOP	External routine
	OUTFIL	External routine
	ERRPRO	External routine

3.10.4 Module Documentation

The following documentation describes information which is specific to each individual module in the documentation group being documented in this specification. It provides a compact way of getting information that would be otherwise buried within each module's source code.

The specific items in this module documentation have the following meanings:

NAME:	Name of program Module.
PURPOSE:	Purpose of Module as detailed in the source code.
LANGUAGE:	Programming language source code is written in. The choices are: VAX-11 FORTRAN C (I/S-1 Workbench 'C') VAX-11 COBOL
MODULE TYPE:	Whether a Program, Subroutine, or Function.
SOURCE FILE:	Name of Source File from file specification.
SOURCE FILE TYPE:	Source File Extension from file specification.
HOST:	Whether this is a host-dependent routine (VAX or IBM) or blank if host-independent.
SUBSYSTEM:	IISS sub-system this file resides in.
SUBDIRECTORY:	Sub-directory of that subsystem in which this file resides.
DOCUMENTATION GROUP:	Name of documentation group of which this source file is a member.
DESCRIPTION:	A description of the module as otained from the source code.
ARGUMENTS:	The arguments with which this routine is called if it is a Subroutine or a Function.
INCLUDE FILES:	A list of all the files that are included into this module as well as their purposes.

ROUTINES CALLED: Subroutines or Functions, either documented or external, called by this module, if any.

CALLED DIRECTLY BY: The documented routines which call this module, if any.

USED IN MAIN PROGRAM(S): The documented Main Programs which contain this module in their parts list according to the list in section 3.10.3.

The Module Documentation is arranged alphabetically according to Module Name.

DOCGROUP PS41255 Module Documentation

NAME: CDQPC
PURPOSE: GENERATE REQUEST PROCESSOR FOR CODASYL DATA BASE
LANGUAGE: VAX-11 COBOL
SOURCE FILE: CDQPC
SOURCE FILE TYPE: COB
HOST:
SUBSYSTEM: CDM
SUBDIRECTORY: NDML

DESCRIPTION:

- CDQPC IS THE PROGRAM WHICH GENERATES THE ACTUAL COBOL CODE FOR CODASYL LIKE QUERY PROCESSOR NEEDED.
THIS IS A SEPARATE PROGRAM STARTED BY THE CDM PRECOMPILER WHEN A CODASYL QUERY PROCESSOR CAN BE GENERATED. IT PRODUCES AN OUTPUT FILE WHICH MUST BE COBOL COMPILED ON THE CORRECT MACHINE
THE GENERATED SOURCE CODE WILL INCLUDE COPY STATEMENTS.

MODIFIED FOR RELEASE 2.3 -- JUNE 11, 1986.

ARGUMENTS:

DB-SCHEMA	DSPLY[X(30)]
DB-SUB-SCHEMA	DSPLY[X(30)]
DB-LOCATION	DSPLY[X(30)]
NUMERIC-NULL-VALUE	DSPLY[X(30)]
CHARACTER-NULL-VALUE	DSPLY[X(30)]
DBMS-LIB	DSPLY[X(30)]
HOST	DSPLY[X(3)]
MY-HOST	DSPLY[X(3)]
QPGC-QPID	DSPLY[X(10)]
IS-ACTION-LIST	RECRD
IS-QUALIFY-LIST	RECRD
CS-ACTION-LIST	RECRD
CS-QUALIFY-LIST	RECRD

SUBTRANS-ID	DSPLY[999]
SUBTRANS-BOOLEAN-LIST	RECRD
BOOLEAN-LIST	RECRD
COMPLEX-MAPPING-ALG-TABLE	RECRD
RFT	RECRD
GC-TABLE	RECRD
RECORD-KEY-TABLE	RECRD
AP-INFO-TABLE	RECRD
FCB-E	DSPLY[S9(9)]
GEN-FILE-NAME	DSPLY[X(80)]
RET-STATUS	DSPLY[X(5)]

INCLUDE FILES:

ERRFS
ERRCDM
FORVAR
INSTTBL
QPG2FD
COBLINE
CONFLD
COBOLOP
ERRORST
TMVALUE
SBSTLST
APINFO
APGC
BOOLST
SUBBOOL
CMAT
APRK
CSAL
CSQUAL
ISQUAL
ISAL
RFTABLE
ERRPRO

ROUTINES CALLED:

GENFIL
OPNFIL
CDRFT
CLSFIL
CDCWF
CDQDF
CDCMPRM
CDGTV
CDMSG
CDRDF
CDPRM
CDGENRT
CDMACR
CDRPCIF
CDQPOP

CDRPIIF
CDRPUIF
CDRPMIF
OUTFIL
RPTERR
ERRPRO

DOCGROUP PS41255 Module Documentation

NAME: CDRPMIF
PURPOSE: GENERATE A COBOL IF STMT FOR USER QUALIFICATIONS EVAL
LANGUAGE: VAX-11 COBOL
SOURCE FILE: CDRPMIF
SOURCE FILE TYPE: COB
HOST:
SUBSYSTEM: CDM
SUBDIRECTORY: NDML

DESCRIPTION:

- THIS ROUTINE WILL GENERATE A COBOL IF STATEMENT THAT WILL EVALUATE USER QUALIFICATIONS CONTAINED IN A NDML WHERE CLAUSE. THE IF STATEMENT WILL BE GENERATED INTO A REQUEST PROCESSOR SUB PROGRAM TO PERFORM THE EVALUATION OF THE WHERE CLAUSE AT THE INTERNAL SCHEMA LEVEL. THIS IF STATEMENT WILL BE NECESSARY FOR ANY UPDATE TRANSACTIONS THAT CONTAIN QUALIFICATION. THIS PROGRAM IS JUST LIKE CDRPIIF, BUT GENERATES THE IF STATEMENT USING DFID'S INSTEAD OF DFNO'S. THIS IS DONE, IF THERE IS A MODIFY USING, OR A DELETE USING WITH UNMAPPED FIELDS. THE REASON WE NEED TO USE DFID'S INSTEAD OF DFNO'S IS BECAUSE THE WAY WE GENERATE CODASYL CODE, WE SET UP THE MODIFY VALUES IN THE WORKING STORAGE VARIABLES BEFORE THE QUALIFICATION IS DONE.

ARGUMENTS:

SUBTRANS-BOOLEAN-LIST	RECRD
IS-QUALIFY-LIST	RECRD
FCB-W	DSPLY[S9(9)]
SUBTRANS-ID	DSPLY[9(3)]
CHARACTER-NULL	DSPLY[X(30)]
NUMERIC-NULL	DSPLY[X(30)]
RET-STATUS	DSPLY[X(5)]

INCLUDE FILES:

CHKCDM
ERRCDM
ERRFS
SUBBOOL
ISQUAL
ERRPRO

ROUTINES CALLED:

CDQPOP
OUTFIL
ERRPRO

3.10.5 Include File Descriptions

The following list contains a purpose and description of each include file in the documentation group as specified in the source code. The language it is written in is also given.

DOCGROUP PS41255 Include File Description

FILE NAME: APGC
PURPOSE: GENERIC CODASYL COMMAND TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

HOLDS THE GENERIC CODASYL DML COMMANDS FOR AN ACCESS PATH OF AN NDML REQUEST

DOCGROUP PS41255 Include File Description

FILE NAME: APINFO
PURPOSE: ACCESS PATH INFORMATION TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

THIS IS A COLLECTION OF INFORMATION STORED IN A NUMBER OF VARIOUS TABLES USED BY THE ACCESS PATH TABLE AND THE GENERIC CODASYL TABLE. SEE CDMP SPEC, PRE6 APINFO.INC

DOCGROUP PS41255 Include File Description

FILE NAME: APRK
PURPOSE: TABLE OF RECORD KEYS FOR CODASYL ACCESS PATHS
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS INFORMATION FOR THE KEYS OF

DOCGROUP PS41255 Include File Description

FILE NAME: BOOLST
PURPOSE: BOOLEAN LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS THE BOOLEAN OPERATORS, PARENTHESES, AND
POINTERS TO THE TYPE 2 CONDITIONS FOR AN NDML

DOCGROUP PS41255 Include File Description

FILE NAME: CHKCDM
PURPOSE: IISS CDMP CHECK STATUS CODES
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS ALL STATUS CODES FOR THE *
CDMP MODULES *

DOCGROUP PS41255 Include File Description

FILE NAME: CMAT
PURPOSE: COMPLEX MAPPING ALGORITHM TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

THIS TABLE IDENTIFIES THE SOFTWARE MODULES

DOCGROUP PS41255 Include File Description

FILE NAME: COBLINE
PURPOSE: COBOL SOURCE CODE LINE DESCRIPTION
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

THIS WORKING STORAGE DESCRIPTION IS USED
IN GENERATING COBOL SOURCE CODE

DOCGROUP PS41255 Include File Description

FILE NAME: COBOLOP
PURPOSE: WORKING STORAGE VARIABLES OPERATOR TRANSLATION
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

DOCGROUP PS41255 Include File Description

FILE NAME: CONFLD
PURPOSE: WORKING STORAGE FOR CONVERSION OF VARIABLES
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

DOCGROUP PS41255 Include File Description

FILE NAME: CSAL
PURPOSE: CONCEPTUAL SCHEMA ACTION LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

TABLE TO HOLD CONCEPTUAL DATA ABOUT THE REQUEST

NOTE!!!!!! This table is cloned in both cdpre5 and cdpre4 so any changes made to this structure needs to be made in these cloned versions. Clone version is CSALX for CDPRE4.

NOTE AGAIN Any changes to the CS-ACTION-ENTRY must be reflected in CDP10B in the C code generation section. The length of CS-STRING2 has been hard coded in the generated C code in paragraph 210-GEN-MOVE-OF-TABLES.

***** THE CONCEPTUAL SCHEMA ACTION LIST

DOCGROUP PS41255 Include File Description

FILE NAME: CSQUAL
PURPOSE: CONCEPTUAL SCHEMA QUALIFY LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS CONCEPTUAL SCHEMA INFORMATION FOR
THE REQUEST'S QUALIFICATION

NOTE!!!!!
This table is cloned as CSQUALX in CDPRE4. If it is changed, CSQUALX must be changed also.

THE CONCEPTUAL SCHEMA QUALIFY LIST

DOCGROUP PS41255 Include File Description

FILE NAME: ERRCDM
PURPOSE: IISS ERROR STATUS CODES FOR CDMP MODULES
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS ALL ERROR CODES USED BY CDMP *
MODULES FOR ERROR HANDLING *

DOCGROUP PS41255 Include File Description

FILE NAME: ERRFS
PURPOSE: ERRFS.INC - FILE I/O PRIMITIVES (FILE SERVICES)
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

IISS ERROR CODES

THIS FILE DEFINES THE FS STATUS
CODES IN COBOL FORMAT

DOCGROUP PS41255 Include File Description

FILE NAME: ERRORST
PURPOSE: WS DEFINITION FOR ERROR STATUS
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

DOCGROUP PS41255 Include File Description

FILE NAME: ERRPRO
PURPOSE: PROCESS ERROR INCLUDE FILE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

DOCGROUP PS41255 Include File Description

FILE NAME: FORVAR
PURPOSE: FORTRAN VARIABLE TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

THIS TABLE HOLDS THE ORIGINAL FORTRAN VARIABLE
AND ITS GENERATED SIX-CHARACTER COUNTERPART.

DOCGROUP PS41255 Include File Description

FILE NAME: INSTTBL
PURPOSE: TABLE CONTAINING ALL GENERIC CODASYL COMMANDS
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

DECODE FOR THE GENERIC CODASYL COMMANDS

DOCGROUP PS41255 Include File Description

FILE NAME: ISAL
PURPOSE: INTERNAL SCHEMA ACTION LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS INTERNAL SCHEMA INFORMATION ABOUT AN
NDML REQUEST

THE INTERNAL SCHEMA ACTION LIST

DOCGROUP PS41255 Include File Description

FILE NAME: ISQUAL
PURPOSE: INTERNAL SCHEMA QUALIFY LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS INTERNAL SCHEMA INFORMATION FOR AN NDML QUALIFICATION

THE INTERNAL SCHEMA QUALIFY LIST

DOCGROUP PS41255 Include File Description

FILE NAME: QPG2FD
PURPOSE: WS DEFINITIONS FOR A FILE DESCRIPTION
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

DOCGROUP PS41255 Include File Description

FILE NAME: RFTABLE
PURPOSE: THE RESULT FIELD TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS CONCEPTUAL SCHEMA INFORMATION ABOUT THE RESULTS OF AN NDML REQUEST

THE RESULT FIELD TABLE

WHEN CHANGING THE STRUCTURE OF THIS TABLE BE SURE TO CHANGE THE LAYOUT IN THE LINKAGE SECTION OF THE DRS (CDS01) WHICH WAS COPIED FROM THIS.

DOCGROUP PS41255 Include File Description

FILE NAME: SBSTLST
PURPOSE: WS DEFINITION FOR THE SUBSTITUTION LIST TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

SUBSTITUTION-LIST REPRESENTS THE INPUT TABLE
OF SUBSTITUTION PARAMETERS FOR THE CDMACR
MACRO EXPANSION SUBROUTINE

DOCGROUP PS41255 Include File Description

FILE NAME: SUBBOOL
PURPOSE: SUBTRANS BOOLEAN LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS ALL THE BOOLEAN OPERATORS, PARENTHESES, AND
CONDITIONS WHICH CAN BE SATISFIED AT THE INTERNAL
SCHEMA LEVEL, FOR EACH SUBTRANSACTION.

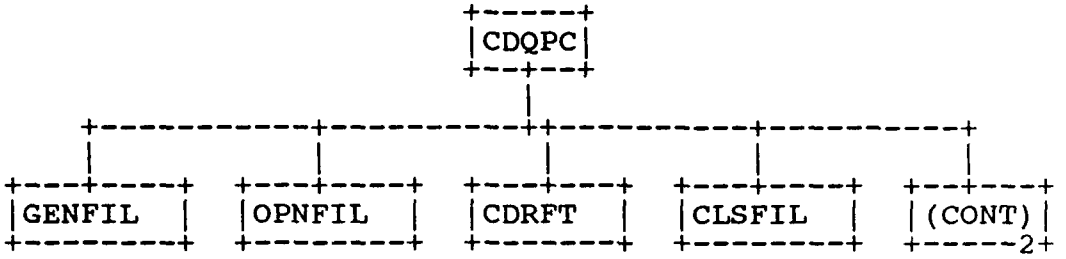
DOCGROUP PS41255 Include File Description

FILE NAME: TMVALUE
PURPOSE: WS DEFINITION FOR TEMPORARY VALUE
LANGUAGE: VAX-11 COBOL

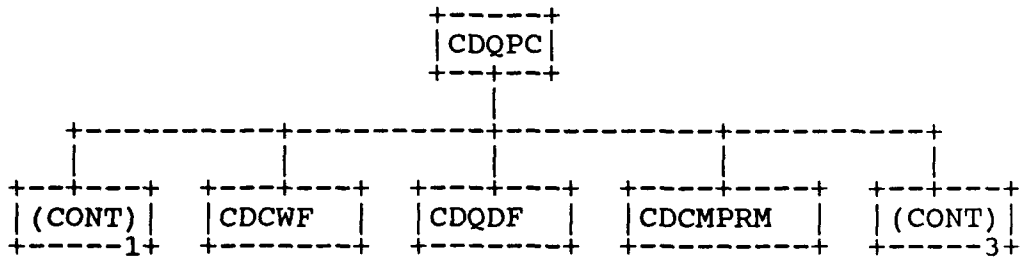
DESCRIPTION:

3.10.6 Hierarchy Chart

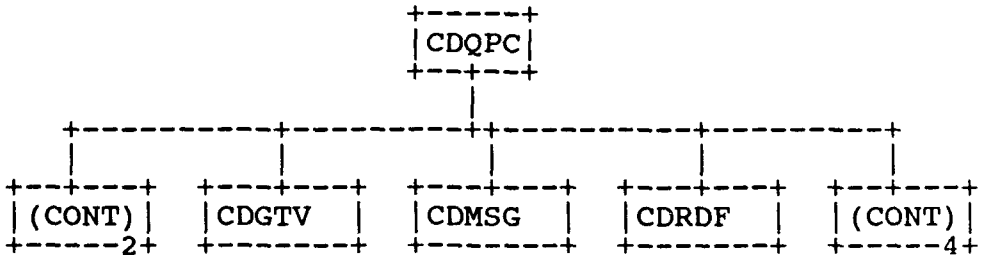
1



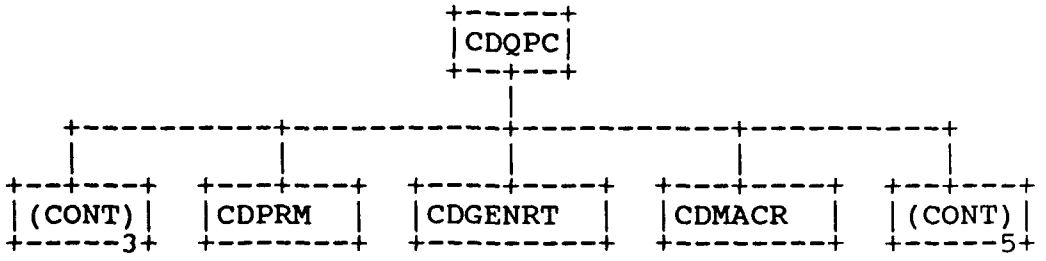
2



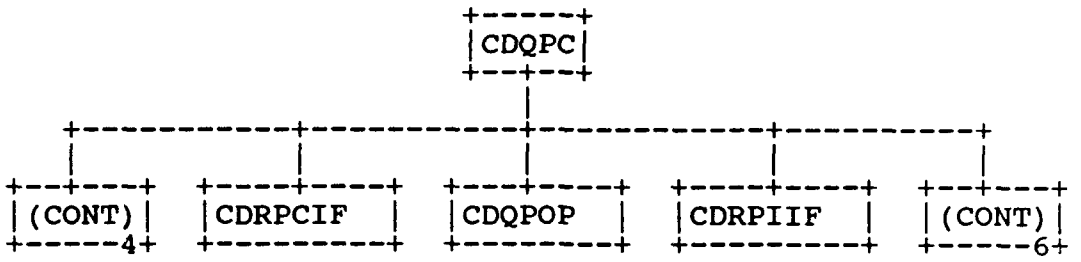
3



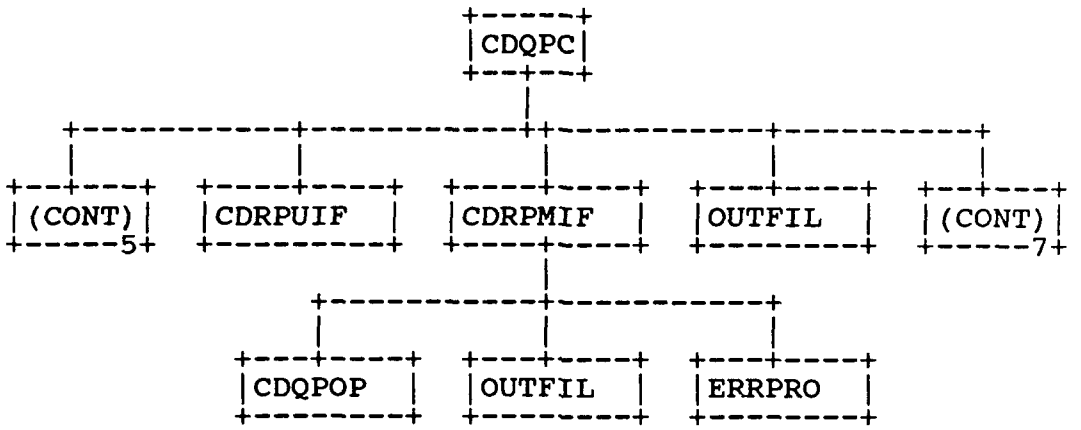
4



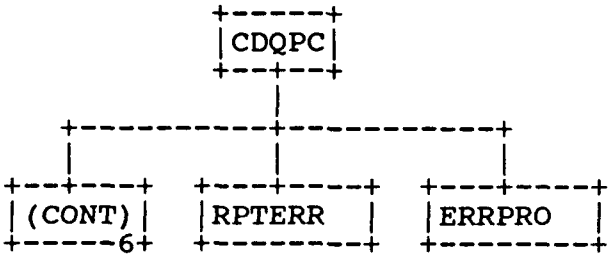
5


CDQPC
(CONT)
4
CDRPCIF
CDQPOP
CDRPIIF
(CONT)
6

6


CDQPC
(CONT)
5
CDRPUIF
CDRPMIF
OUTFIL
(CONT)
7
CDQPOP
OUTFIL
ERRPRO

7


CDQPC
(CONT)
6
RPTERR
ERRPRO

CDCMPRM
CDCWF
CDGENRT
CDGTV
CDMACR
CDMSG
CDPRM
CDQDF
CDQPC.....1
CDQPOP
CDRDF
CDRFT
CDRPCIF
CDRPIIF
CDRPMIF 6
CDRPUIF
CLSFIL
ERRPRO
GENFIL
OPNFIL
OUTFIL
RPTERR

3.11 Program Listings Comments

This information is contained in the Module Descriptions in section 3.10.

SECTION 4

QUALITY ASSURANCE PROVISIONS

4.1 Introduction and Definitions

"Testing" is a systematic process that may be preplanned and explicitly stated. Test techniques and procedures may be defined in advance, and a sequence of test steps may be specified. "Debugging" is the process of isolation and correction of the cause of an error.

"Antibugging" is defined as the philosophy of writing programs in such a way as to make bugs less likely to occur and when they do occur, to make them more noticeable to the programmer and the user. In other words, as much error checking as is practical and possible in each routine should be performed.

4.2 Computer Programming Test and Evaluation

The quality assurance provisions for test consists of the normal testing techniques that are accomplished during the construction process. They consist of design and code walk-throughs, unit testing, and integration testing. These tests are performed by the design team. Structured design, design walk-through and the incorporation of "antibugging" facilitate this testing by exposing and addressing problem areas before they become coded "bugs."

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